

root, but are "blocked" *up* the anterior root, and diminished *down* that root. But in the inferences *qua* functional impulses derived from these data, two considerations appear to have been insufficiently borne in mind—(1) The rapid death of interrupting grey matter as compared with the endurance of white matter, and (2) the disproportionate magnitude of negative variations by *electrical* excitation as compared with negative variations by *functional* excitation. The contrast between interrupted and non-interrupted tracts, as regards the transmission, gauged electrically, may have been in part due to the first cause, and an adequate recognition of the second fact would have withheld Prof. Horsley from expressing astonishment—"a revelation to us" is his phrase—at finding the electrical variation in a nerve eight or ten times as great by direct electrical excitation as by discharge of a nerve centre. Du Bois-Reymond's analogous deflections obtained on strychninized frogs were 1° to 4° *versus* 40° by direct electrical excitation. A functional discharge *down* posterior roots, if proved to occur, is a new and surprising phenomenon; but its existence is not *at present* proved by the existence of an electrical discharge; electrical effects by electrical excitation are tainted evidence, electrical effects down the posterior roots by functional excitations above, although incidentally touched upon, were not exhaustively examined, and considering the recognized dangers of experimental fallacy, we may not admit as proved that nervous impulses are discharged down afferent channels. Prof. Horsley infers unreservedly that functional discharge occurs *down* the posterior roots, and that centripetal impulses *up* the anterior roots are blocked at the cord. This he regards as striking evidence of the truth of the kinæsthetic doctrine (*i.e.*, that nerve action starts from the afferent or sensory side of the nerve centre, p. 170); but the connection between this presumed functional downflow in afferent channels and kinæsthesia is not made apparent; up-flow in afferent channels is matter of common knowledge; up-flow by efferent channels has (so far as we know) been contended for by no one since Lewes. But as regards these last points, they may be expected to receive fuller and more precise analysis in the promised volumes on the brain and on physiological psychology.

A. D. W.

ELECTROTECHNICAL TRAINING.

Electrical Engineering as a Profession and How to Enter It. By A. D. Southam. (London: Whittaker and Co., 1892.)

THIS book consists of a collection of extracts from the notices of various firms regarding apprentices and articulated pupils, and from the prospectuses of colleges which give an education in electrical engineering. It reminds us of the gorgeous but depressing volumes one has met so often in one's summer outing, containing particulars of hotels in Aden, hotels in Algiers, hotels in Andermatt, &c., each hotel possessing, at least so it is said in the gilt-edged page advertisement, every possible attraction—a magnificent view, a first-rate cuisine, electric light, ascenseur, and all the other dreariness of a bandboxy barrack.

NO. 1200, VOL. 46]

First we thought that the length of description which the author had given to a particular technical educational establishment was a measure of its goodness, but that idea we dismissed when we found that only three pages of description were given to that technical college in South Kensington, regarding which the author says: "This institution deservedly stands at the head of all the technical institutions in this country." Next it occurred to us that the author might have acted on the "good wine needs no bush" principle; but that hypothesis had to follow the other, for we feel sure that the Walker Engineering Laboratory at Liverpool is not bad, and yet it requires fifteen pages of talking about. Then we wondered whether each professor had been asked to write as much as he liked, so that the length of the description of a particular set of laboratories was in proportion to the leisure of the writer; and lastly, we have been speculating whether the likeness to the "Hotels of the World" book might not be quite complete, and the length of the description was a measure of the length of the purse of the advertiser.

However, be the plan of the compilation what it may, the book contains a good deal of information, also some salutary advice with which we quite agree:—"Undoubtedly the best training for a young man entering the electrical profession is to go through the course at one of the technical schools or colleges, and then when thoroughly grounded in the theory and having a general idea of the practice of his profession, to be articulated for some months to a good firm of electrical engineers, where he will be able to acquaint himself with the practical part of his business as actually carried out on commercial principles;" and again, "if he then goes to both a Technical College and is also articulated, it is advisable that the former should precede the latter, for the reason that when he is placed in the workshop his previous technical training will enable him to appreciate and see the importance of much which he would otherwise have overlooked."

For the fathers who desire to place their sons directly in a works on leaving school, there is given a long list of engineering firms who are willing to receive £300 and the lad; some are willing to take only one hundred and twenty guineas a year, from year to year, or even as little as £100 a year—and the lad. In many cases a month's trial is allowed, but judging from the ignorance of elementary mathematics and science displayed by many articulated pupils in works, we presume that either these subjects are not required, or a month is not a long enough time for this astonishing ignorance to be discovered. Naturally enough these firms do not bind themselves to provide work for these articulated pupils when their term is finished; indeed we know of a firm with over 100 articulated pupils which is applying elsewhere for an assistant.

When will the parental idea die out that a lad who is pitchforked into a works must turn out an engineer? No doubt many of our successful engineers never received any education in a technical college; so many of our battles were won by men armed only with bows and arrows, but that is no reason for confining the equipment of a modern regiment to these primitive weapons. Either the teaching given at a technical college materially helps the lad in his subsequent practice in the works, or it is a fraud and ought to be stamped out. If it affords real help

to the lad, then why, we ask, do not the firms insist on their pupils obtaining it before they enter the works?

Mere evening instruction for a lad who has been hammering, say, from 6 a.m. to 6 p.m. is well-nigh useless, and at the best ought to be regarded only as a makeshift for those who are compelled to spend the day earning their living. To place a lad at a technical college for two years, and then for two years at a works would cost, as far as fees and premium are concerned, about £250. To article him for three years at the works about £300. When will parents see that the cheaper course is far the better, and when will firms refuse to take an articulated pupil unless he has already acquired that theoretical knowledge which is necessary to enable him to benefit by a works training? The father who articles his son to an engineering firm immediately the lad leaves school and expects him to pick up his technical education at odd moments, may be more liberal in his money, but certainly is no more liberal in his ideas than the parents who sent their sons to receive their practical training at Dotheboy's Hall. "Now, then, where's the first boy?" "Please, sir, he's cleaning the back parlour window." "So he is, to be sure," rejoined Squeers. "We go upon the practical mode of teaching, Nickleby. . . C-l-e-a-n, clean, verb active, to make bright, to scour. W-i-n, win, d-e-r, der, winder, a casement. When a boy knows this out of a book he goes and does it." P. D.

HYGIENE AND PUBLIC HEALTH.

A Treatise on Hygiene and Public Health. Edited by T. Stevenson, M.D., F.R.C.P. (Official Analyst to the Home Office), and Shirley Murphy (Medical Officer of Health of the Administrative County of London). Vol. I.

THIS is a treatise consisting of various contributions from different writers. In the selection of authors it has been wisely decided not to limit the choice to members of the medical profession, and the wisdom of this decision has been exemplified in the acquisition of two of the very best articles which the book contains, *i.e.* that by P. Gordon Smith, F.R.I.B.A., and Keith D. Young, F.R.I.B.A., entitled "The Dwelling," and that by W. N. Shaw, F.R.S., headed "Warming and Ventilation."

There are at present several excellent small works upon hygiene and public health, but these of necessity treat of the subject in far too cursory a manner—indeed, they are designed more to meet the requirements of candidates for the Public Health Diplomas now granted by many examining Boards. This work is evidently intended as a book of reference, and there is no doubt that it will be of great value to those from whom a special knowledge of public health work is demanded. While, then, the last year or two have been remarkably fruitful in the production of works upon the subject here treated of, the volume before us will not be one jot the less appreciated on this account, for it meets a want which must long have been felt among those who desire a better and more inclusive knowledge of public health matters than was hitherto accessible in a collective form.

It is needless to insist that the work is all well done,

NO. 1200, VOL. 46]

and that any shortcomings must, of necessity, be faults of omission rather than of commission, for the list of contributors includes those who occupy some of the foremost positions as authorities upon the subjects of which they treat. It is not an easy task—and one is conscious of running great risk of appearing arrogant—to single out those sections especially deserving of praise. If this is permissible in such a work, we should point to the two articles already mentioned as occupying a foremost place—indeed, the article upon "Warming and Ventilation" is a little too exhaustive and technical in its physical aspect, and deals too briefly and sparingly with the commoner provisions now used for both the purposes of warming and ventilation;—a shortcoming which has the effect of somewhat sacrificing the practical utility of the article to its bulk, when viewed from the health officer's standpoint. It would not be easy to speak in terms too high of the all-round excellence of the article upon "Disposal of Refuse," by Prof. W. H. Corfield, M.A., M.D., and Louis C. Parkes, M.D., D.P.H., and the work of compiling this section could not have been entrusted to more capable hands. "Water," by T. Stevenson, M.D., is a capital article, but one would like to have seen in it more about the methods of collecting water and distributing it, and of the risks which the water runs of pollution in and around dwellings.

In the preface we read that "it has been the desire of the editors that the several papers which these volumes contain should present a fair account of the knowledge, so far as obtainable, of the subjects of which they treat"; and this is invariably achieved, for where the account is not an excellent one, it is always more than a "fair" one.

The contribution upon "Air," by Prof. J. Lane Notter, M.A., M.D., is too short, and does not nearly include all the material given in his edition of Edmund Parke's work; and the same fault may be found with the articles upon "Hospital Hygiene," by H. G. Howse, M.S., and "The Inspection of Meat," by E. W. Hope, M.D., D.Sc.

"Systematic Physical Education"—a subject which has been all too little studied in this country—is well and spiritedly treated of by F. Treves, F.R.C.S.

The articles upon "Baths," by H. Hale White, M.D.; "Clothing," by G. V. Poore, M.D.; "Food," by Sidney Martin, M.D.; "Soil," by S. M. Copeman, M.A., M.D., D.P.H.; "Meteorology," by G. F. Symons, F.R.S.; "The Influence of Climate upon Health," by C. T. Williams, M.A., M.D.; "Offensive and Noxious Businesses," by T. W. Hime, B.A., M.D.; and "Slaughter Houses and their Administration," by E. W. Hope, M.D., D.Sc., are all good, though some of them might have been fuller. The article upon "The Influence of Climate upon Health" might with advantage have considered much more fully the reasons why the various climatic conditions influence the health of man in the way they do. The contribution upon "Meteorology," which is capably illustrated, and one of the most useful in the book, might also have considered the physical causes which affect the readings of the various instruments, and dealt more fully with the principles upon which these are constructed. The article upon "Food" is excellent in some respects, but an attempt to convey to the reader, in an abstract form, the methods of food analysis fails—as